Designing an Experiment Guide

# What do you want to find out?

The first step of the experiment is to look around you and think about a question that you would like to answer using science. Your question must be

* small enough that you can answer it with the materials available to you.
* testable or measurable
* be interesting to you not something that you already know the answer to

Which do you think is a better question?

How close can a human get to the sun before they die? ...or….

Which cafeteria drink is the most corrosive?

Remember your question words: How, why, when, what, where?

*For an experiment to really be an experiment and not just a demonstration, you need to be looking at something that you don’t know the answer to already. If you know what is going to happen you aren’t experimenting.*

# Translate your question into an aim.

Your aim is the objective for your experiment. It is what you should have achieved by the end of the experiment. Remember that an aim should…

## Suggested verbs to use in your aim:

* Investigate
* Find out
* Measure
* Compare
* Prove
* Classify
* Examine
* start with “To…” and a verb.
* be no more than one sentence
* summarise what you are trying to find out

E.g. To compare the densities of different liquids or

To find out which household chemical reactions give off the most gas.

# Choosing our Variables

When designing our experiment we need to think about our variables (the different elements of our experiment. We need to look at our aim and decide

* What is it that we are testing and will change throughout the experiment (independent variable)
* What are we observing or looking for each time we make a change. What is the reaction? (Dependant variable)
* What are we going to keep the same to make the experiment fair (Control Variables)

For your method to be really “fair” you must only have one independent variable (the one that changes). This will be element of your experiment that you are testing. To measure your results easily, you should also only have one dependant variable because if we are looking for ten different reactions we will have a hard time recording what happened.

## For example, if my aim is…

After we know what we are changing and what result we are observing from this change, we need to decide what we will **control** or keep the same to make the experiment fair. For example, it wouldn’t be fair to give one drink more time to corrode than another. Therefore we need to control the length of each experiment

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I know this is my **dependent variable** because this is the result that I am observing…how much the drink corrodes a material. This depends of the drink type.

I know this is my **independent variable** because I will be testing more than one type of drink.

To investigate which cafeteria drinks are the most corrosive

# Method

You have done the hard part of designing your experiment. Now you need to write in a step by step manner how the experiment should be carried out. You must take into consideration your control variables. For example, if you have said that you will **control how much of each drink you will use**, you must give an exact amount in your method and if you have said that you will control the amount of time each sample will be left you need to say how long.

e.g.

1. Take three test tubes and put **50ml** of coca-cola in the first tube, **50ml** of water in the second and **50ml** of orange juice in the third.
2. Place one $200 coin in each tube.
3. Leave the tubes for 24hrs and record any changes in the coins.

Your instructions should be clear enough that anyone could come after you and repeat the experiment easily. They should be numbered and each instruction should start with a verb.

# Materials

Make a list of all the materials needed for your experiment. More detailed lab reports give information or even an image of each material.

Ice- H2O in a solid state. It will be used to cool the mixture

# Hypothesis

A hypothesis is more than a guess. This is where you make a prediction based on the knowledge you already have. You should

* always give reasons for why that is what will happen.
* not have personal pronouns (I, we)
* be a statement

“The hand soap will be the most dense and sink to the bottom because it is denser and heavier than the water and oil.”

# Results

There are many ways to record the results of your experiment. You may use a table to record your measurements, write notes about your observations, take photographs to show progress or even use a video. It is extremely important though, that you keep results organised and record **exactly** what you observe.

NEVER, EVER change the results of your experiment to match what you want them to say. This is FRAUD!

# http://hrsbstaff.ednet.ns.ca/benoitn/chem11/units/3.%20Stoichiometry/reactions/ionic-substance-dissolving-in-H2O.jpgDiagram

You may include a diagram of your experiment to help illustrate your results and conclusions. (A labelled photograph or drawing of your experiment.) Diagrams often help to make a report easier to understand.

# Conclusions

After carrying out the experiment you must look at your results and think about what can be learned from them. These questions could help…

* Was your hypothesis correct?
* Why did you get these results?
* How does this relate to knowledge you already have?
* What new knowledge have you gained?

# Evaluation

This stage is about assessing how successful and how scientific you were with your experiment. These questions might help…

* Was the experiment successful? Why/why not?
* What would you change if you did it again?
* What real world applications can you think of for your new knowledge?